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ABSTRACT

Achievement and attitudes of pupils in Grades 1, 3, and 5 in the experimental school were compared with those of pupils in control schools. No systematic differences in students' achievement were found to exist between the Multiunit School and I and R Unit and their control schools. The analyses suggest two major conclusions: First, the achievement of students does not seem to be affected adversely during the transition from traditional self-contained school organization to the Multiunit plan. Second, further longitudinal data concerning the achievement of Multiunit and I and R Unit students in comparison to control school students is warranted and essential. Significant achievement gains by Multiunit students are likely to come, if at all, after the first and perhaps the second year of Multiunit operation, at a time when operational proficiency has been reached. (Author)

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Technical Report No. 76

STUDENT ACHIEVEMENT AND ATTITUDES IN INSTRUCTION AND RESEARCH UNITS IN TWO ELEMENTARY SCHOOLS IN JANESVILLE, WISCONSIN, 1967-68

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Report from Project MODELS
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Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
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STATEMENT OF FOCUS

The Wisconsin Research and Development Center for Cognitive Learning focuses on contributing to a better understanding of cognitive learning by children and youth and to the improvement of related educational practices. The strategy for research and development is comprehensive. It includes basic research to generate new knowledge about the conditions and processes of learning and about the processes of instruction, and the subsequent development of research-based instructional materials, many of which are designed for use by teachers and others for use by students. These materials are tested and refined in school settings. Throughout these operations behavioral scientists, curriculum experts, academic scholars, and school people interact, insuring that the results of Center activities are based soundly on knowledge of subject matter and cognitive learning and that they are applied to the improvement of educational practice.

This Technical Report is from Project MODELS (Maximizing Opportunities for Development and Experimentation on Learning in the Schools) in Program 3. General objectives of the Program are to develop and test organizations that facilitate research and development activities in the schools and to develop and test the effectiveness of the means whereby schools select, introduce, and utilize the results of research and development. Contributing to these program objectives, Project MODELS' primary objective is to develop and test a school environment for facilitating student learning, research and development, and teacher education in local schools. The Multiunit Elementary School is the new organizational pattern developed.

PREFACE

A major objective of the Wisconsin Research and Development Center for Cognitive Learning is to develop an environment in local schools and school systems which facilitates individually guided learning by students, research and development activities, and the inservice development of teachers. One component of such an environment is the Multiunit organizational plan for elementary schools, and its basic element, the Instruction and Research Unit. This report is concerned with comparing the attitudes and achievement of students in one Multiunit school and in an I and R Unit in a second school in Janesville, with that of students in three more traditionally organized control schools in the same city.

Many people other than the authors contributed their skills in planning, executing and analyzing the research reported herein. In the Janesville schools, Dr. Robb Shanks, Assistant Superintendent for Instruction, Mr. Lewis Loofboro, Elementary Supervisor, and Mr. Ralph Mitby, Director of Pupil Services, aided in planning and arranging the field-testing program. The principals and unit leaders of the Multiunit school, and the principal and unit leader of the school containing the single I and R unit gave invaluable cooperation and assistance: Mr. Norman Graper, Mrs. Connie Glowacki, Mrs. Helen Johns, Mrs. Esther Olson, Miss Norma Smith, and Mr. Thomas Delamater of the Wilson Elementary School; and Mr. Robert Cook and Mr. Dwane Kamla of the Adams Elementary School. The teachers of these schools and the principals and teachers of the three control schools assisted by giving of their own and their students' time.

Professor Herbert J. Klausmeier, a Principal Investigator of Project MODELS and Director of the Wisconsin R & D Center, initiated the idea of I and R Units, and has been primarily responsible for the conceptualization of the Multiunit school and for broad implementation strategies in the local schools. Mr. Tommy Johnson aided in writing this report, and assisted in the analysis of the data, as did Mr. James Bavry, Mr. Paul Fotsch, and Mrs. Barbara Jordan. Mrs. Mary Quilling helped plan the testing program and edited the report. Mr. Fotsch also assisted in the general planning and execution of the field-testing program. Mrs. Doris Cook assumed primary responsibility for working with the personnel at Wilson School throughout the year, and Miss Mary Lou Ellison also provided them assistance and advice.

The authors acknowledge with appreciation the contributions of the above.

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ABSTRACT

In this report data are presented which indicate how well a Multiunit School and an Instruction and Research Unit in Janesville, Wisconsin, met their instructional objectives during the 1967–68 school year. Achievement and attitudes of pupils in Grades 1, 3, and 5 in the experimental school were compared with those of pupils in control schools.

No systematic differences in students' achievement were found to exist between the Multiunit School and I and R Unit and their control schools. Although differences did appear in specific subject matters at specific grade levels, the total pattern of growth in achievement did not differ substantially. There is insufficient evidence to conclude either that there were or were not significant differences in experimental and control students' attitudes towards school.

The analyses suggest two major conclusions: First, the achievement of students does not seem to be affected adversely during the transition from traditional, self-contained school organization to the Multiunit plan. Although Wilson School began that transition in the fall of 1967, Wilson students apparently did not lose ground in achievement during 1967–68 in comparison to control school students. Second, further longitudinal data concerning the achievement of Multiunit and I and R Unit students in comparison to control school students is warranted and essential. Significant achievement gains by Multiunit students are likely to come, if at all, after the first and perhaps the second year of Multiunit operation, at a time when operational proficiency has been reached.

1
INTRODUCTION

Securing more efficient pupil learning continues to be the main focus of research and development activities conducted jointly by the Wisconsin R & D Center and several school systems as part of Project MODELS (Maximizing Opportunities for Development and Experimentation in Learning in the Schools).

As a result of meetings between Center and local school personnel, 17 Instruction and Research Units replaced graded self-contained classrooms in four Wisconsin school systems during the second semester of 1965–66. During 1966–67, 23 I and R Units existed in five Wisconsin systems. Two of these Units were located in Janesville, and data concerning their activities has been reported previously.[1]

During 1967–68, the concept of the I and R Unit has been expanded into the more complex concept of the Multiunit elementary school. The Multiunit school pattern has been in operation in seven elementary schools in three Wisconsin school systems during 1967–68. One of these Multiunit schools is the Wilson School in Janesville. In addition, the Adams School in Janesville has continued its I and R Unit at the fifth- and sixth-grade level.

The Multiunit School is intended (1) to provide an environment in which individually guided learning can be developed, (2) to facilitate research which is essential for improving instruction, (3) to bring into the school promising educational innovations, and (4) to facilitate the preservice and in-service development of teachers. This report is concerned with the effective stimulation of student learning in Multiunit Schools and I and R Units in relation to schools made up of self-contained classrooms. The attitudes and achievement of students in the Multiunit School and the I and R Units in Janesville will be compared to the attitudes and achievement of students in three more traditionally organized schools in the same city.

The concept of the Multiunit School includes both a formal organizational structure and a procedural style. Figure 1 illustrates the prototypic organizational plan of the Multiunit School.

At the classroom level is the I and R Unit, consisting of a Unit Leader, several professional teachers, an instructional aide, an instructional secretary, and a number of children of a certain age group. Grade designations are abandoned, and flexible planning and instructional practices are adopted.

At the policy levels are the Instructional Improvement Committee, chaired by the principal and including the unit leaders and those central office consultants who are concerned with the fields of learning being emphasized by the school, and a System-Wide Policy Committee which establishes broad policies and guidelines.

The Multiunit pattern of organization permits several procedural improvements: cooperative planning and teaching, the participation in educational decisions of all who are directly involved, greater role differentiation and role clarity, a more effective leadership structure, and a more effective communications flow. Ideally the Multiunit School provides the flexibility and exchange necessary for the effective improvement of instruction.

The strategy of improving instruction in a Multiunit School or in an I and R Unit is complex, involving attempts to simultaneously utilize time, space, equipment, supplies, instructional methods, instructional personnel, subject-matter content and sequence, and evaluation procedures in a more effective

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[1] Doris M. Cook, James L. Wardrop, Glenn E. Tagatz, Mary Quilling, Dwane Kamela, & Lana Shulman. *Research and Development Activities in R and I Units of Two Elementary Schools of Janesville, Wisconsin, 1966–67.* Technical Report of the Wisconsin R & D Center for Cognitive Learning, University of Wisconsin, 1968, No. 45.

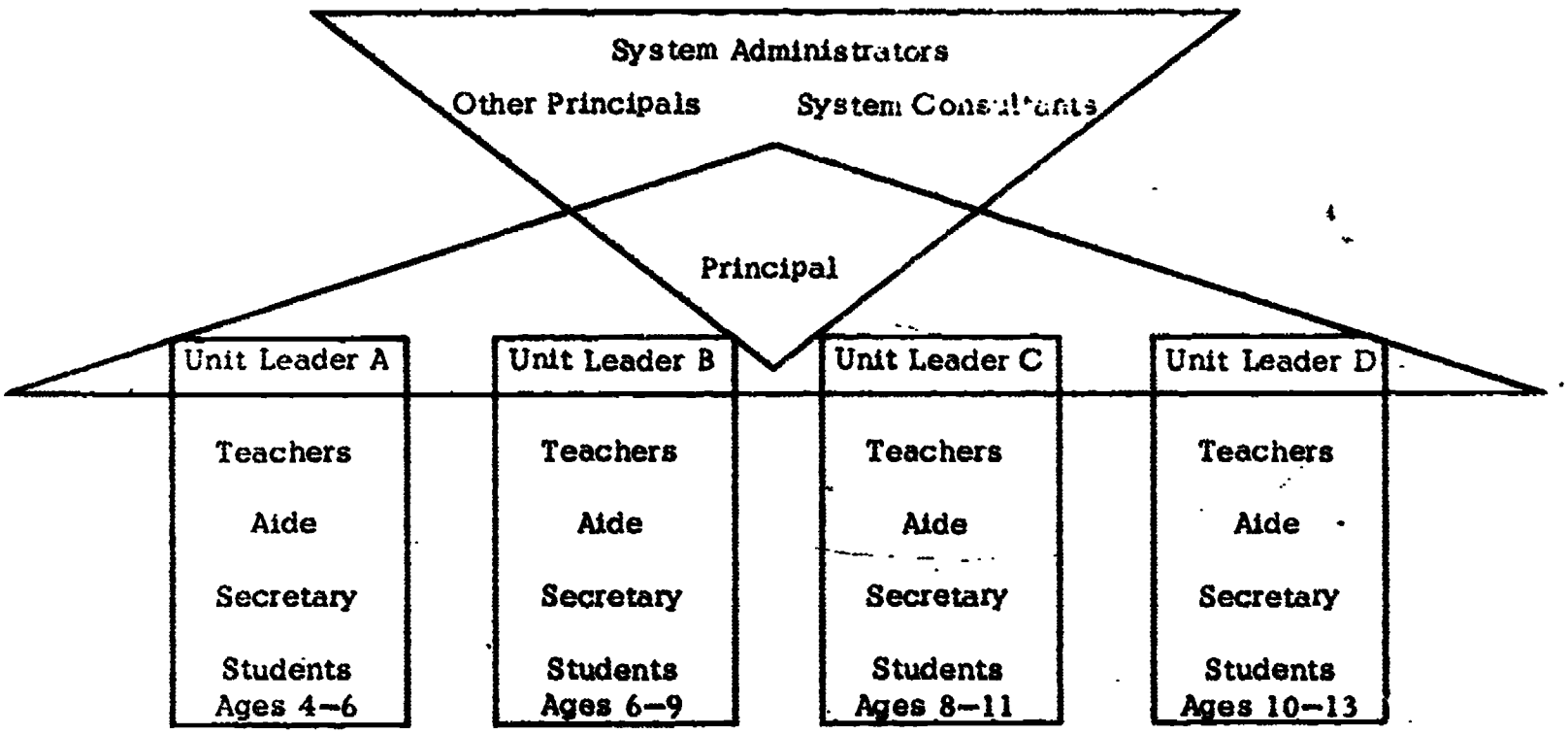

Figure 1. Prototypic Organizational Plan of a Multiunit School

manner in order to achieve an efficient, individually guided learning program for each child. When using a total-systems strategy for the improvement of instruction, more time is required to integrate the various components. However, the possibility for making significant improvements is large.

During its early existence, a Multiunit School must necessarily place its major effort upon achieving smooth operation by its Units and gaining familiarity with the total-systems strategy for the improvement of instruction. While this is being done, as it has been in the Janesville Multiunit School and I and R Unit during 1967–68, dramatic gains in student achievement are not to be expected. Once the Multiunit Schools and I and R Units have achieved operational skill and can turn their primary attention to instructional improvement, we may anticipate substantial improvement in student achievement over that typical of the self-contained classroom school.

The Multiunit School in Janesville focused its first-year efforts on the improvement of instruction in the language arts. The staff worked closely with Janesville language arts and reading consultants and with reading specialists from the R & D Center. In addition, an R & D Center specialist in individualization of instruction worked with the Wilson staff throughout the year.

The approach to individually guided learning employed in the Multiunit Schools is one of arranging a program of instruction for each child that will meet the various objectives of the educational program. This in turn calls for some instruction on a one-to-one basis, some independent study, some small-group activities, and some large-group instruction.

Each child is initially placed according to his aptitude, prior achievement, learning style, and unique problems, and he is continually reassessed and guided into different learning activities and groups as needed.

In instruction on a one-to-one basis, the child proceeds at a rate appropriate for him. This type of individualized work with the teacher and independent study are required to meet those objectives concerned with the acquisition of independent skills. Some educational objectives require instruction in small groups. Pupils may be brought together in groups of 2 to 15 or more to work on specific activities of a fairly homogeneous type; for example, 2 to 15 children from a total group of 100 may be brought together for specific instruction related to acquisition of certain concepts or processes in arithmetic. Small groups also may be brought together to deal with the same word recognition skills. Small groups may be formed on the basis of interest, friendship, neighborhood, residence, and the like in social studies in connection with achieving certain objectives related to communication skills and attitude development. The extent to which large groups of 75 to 150 children may be brought together effectively has not been tested systematically. It is known that students may engage in individual study activities simultaneously in large groups. In the Units in the elementary school, a principal reason for bringing all the students within the Unit together into the same group for part of the instructional day is to achieve better utilization of teacher time. Children participating in independent study or some other large groups activity can proceed without all of the instructional staff of the Unit being present. This in turn frees part of the instructional staff during that period of time for planning, conferring, and executing other activities essential for making the small-group and one-to-one instructional activities work effectively.

In the summer and fall of 1967, a plan for field-testing the Multiunit Schools and I and R Units was developed. Although it will be explained in detail in the succeeding chapters of this report, its major dimensions should be outlined here.

Control schools, organized in more-or-less traditional patterns, were identified for the Multiunit School and the I and R Unit. Matching was done on the basis of students' mean IQ scores and past achievement and on the basis of approximate similarity in their socioeconomic backgrounds. Using an item-sampling approach, the achievement levels of students in the Multiunit Schools and controls were tested in the fall of 1967 and the spring of 1968. In addition, a student attitude scale was constructed and administered in all five schools in the spring of 1968.

It was, of course, recognized that achievement and attitudes are affected by many variables, only one of which is the organizational pattern of the school. We therefore attempted to assess certain of these other variables—for example, the preparation and experience of teachers and the relative emphases given various subjects—by two means: (1) a questionnaire designed for principals, unit leaders and teachers; and (2) an examination of the school system's personnel records. The descriptive data obtained will be used throughout this report to interpret and evaluate the attitude and achievement data.

II

DESCRIPTION OF METHODS AND PROCEDURES

It is the purpose of this chapter to describe the instruments and procedures used in the study. The experimental subjects in Janesville were first-, third-, and fifth-grade students in the Multiunit School (Wilson) and fifth-grade students in the I and R Unit (Adams), and comparable students in control schools were selected for both. Three control schools were identified: one to serve as a control for first- and third-grade pupils at Wilson, another as a control for fifth-grade pupils at Wilson, and a third to serve as a control for the fifth-grade students of the I and R Unit at Adams. The following data were obtained for both the experimental and control schools: (1) students' achievement; (2) students' attitudes towards school; (3) selected characteristics of the teaching staff; and (4) selected characteristics of the teaching patterns. Additional data describing the utilization of teacher time were obtained only for Wilson School and one of its controls.

The following sections describe the procedures and instruments which were used.

SUBJECTS AND SELECTION OF CONTROLS

Subjects for the study were the students of the Multiunit School and the I and R Unit in Janesville, and students of selected control schools in the same city. Only those students in Grades 1, 3, and 5 were tested for purposes of this study as they were considered representative of the students as a whole. Control schools were selected on the basis of the following criteria, listed in order of importance:

a) Measure of intelligence
b) Measure of past academic achievement
c) Socioeconomic level of students

Group averages of IQ and achievement scores from school year 1966–67 were used for selection of control schools; socioeconomic levels were estimated by school officials.

Adequacy of controls was checked by comparing the scores of experimental and control subjects on the pretests which were administered in October 1967.

Table 1 summarizes the sample sizes for the Janesville schools and their controls.

Table 1. Number of Subjects from Each Experimental School and Its Control in Janesville

School	Grade 1		Grade 3		Grade 5	
	Pre	Post	Pre	Post	Pre	Post
Wilson	94	100	94	92	66	64
Control	105	112	86	87	98	88
Adams					90	87
Control					63	63

ACHIEVEMENT TESTS

Because assessment of the several areas of academic achievement which are included in the curricula of elementary schools would require several days of testing time, it was decided to compile a battery of academic achievement measures utilizing item sampling.

Item sampling is a technique for estimating the performance of a group on a test without having each student in the group take all items in the test. Items from a test are randomly sampled without replacement and sets of items from a number of tests organized into booklets. These booklets are randomly assigned to students within classes, each student thus taking only a small random sample of the total number of items. The mean, variance, and reliability for each subtest are calculated and, using formulas similar to the standard ones for lengthening of a test, an

estimate of each total test parameter is obtained from the subtest. A final estimate of each total test parameter may be obtained by averaging over the total number of booklets.

Some tests were not item sampled but given in their entirety to all students. If item sampling was used the letters "IS" appear in parentheses after the test in the listing which follows.

First-Grade Pretest (mathematics only)

Metropolitan Achievement Tests, Primary I, Form A. Test 4, Arithmetic Concepts and Skills.

First-Grade Posttest (mathematics only)

SRA Achievement Series, Arithmetic 1–2, Form C, Number Games.

Third-Grade Pretests

Mathematics

Stanford Achievement Test, Primary II Battery, Form Y, Computation sections only (IS).
SRA Achievement Series, Form 3–1A, Concepts, problem solving (IS).
Iowa Tests of Basic Skills, Form 4, Concepts, problem solving (IS).

Reading

Doren Diagnostic Reading Test.
Gates-MacGinitie Reading Test, Primary C, Form II (IS).

Third-Grade Posttests

Mathematics

Stanford Achievement Test, Intermediate I, Form X, Computatior sections only (IS).
SRA Achievement Series, Test 4, Form 3–4A, Concepts, problem solving, computation (IS).
Iowa Tests of Basic Skills, Form 4, Concepts, problem solving (IS).

Reading

Same as pretests.

Fifth-Grade Pretests

Mathematics

SRA Achievement Series, Multi-level Edition, Form C, Blue Level, concepts, reasoning, computation (IS).
Iowa Tests of Basic Skills, Form 4, Concepts, problem solving (IS).

Reading

Iowa Tests of Basic Skills, Form 4
Test V, Vocabulary (IS)
Test R, Reading comprehension (IS)
Test W, Work study skills (IS)
- W-1 Map reading
- W-2 Reading graphs and tables
- W-3 Knowledge and use of reference materials

Science

Sequential Tests of Educational Progress, Form 4a (IS)
Stanford Achievement Tests, Intermediate I, Form X, Test 10 (IS).

Fifth-Grade Posttests

Mathematics

Stanford Achievement Test, Intermediate II, Form W, computation section only (IS).
SRA Achievement Series, Multi-level Edition, Form C, Blue Level, concepts, reasoning, computation (IS).
Iowa Test of Basic Skills, Form 4, Concepts, problem solving (IS)

Reading

Same as pretests.

Science

Same as pretests.

All pre- and posttests were administered by substitute teachers. Therefore all test administrators were experienced in giving classroom tests, yet were not closely associated with the students whom they were testing. The pretests were administered in October 1967; the posttests in April 1968.

ATTITUDE SURVEY

A Thurstonian attitude survey was administered to subjects in third and fifth grades in April, 1968. The purpose of this survey was to assess positive or negative affect of the students toward school and teachers in general.

The survey instrument was developed from responses to two open-ended questions given to students in the Wilson Elementary School in Janesville. The questions were as follows:

A. What do you like best about school? Why?
B. If you could change one thing about school what would you change? Why?

Eighty-four statements were selected from the responses to these questions. Twenty judges rated each statement on an eleven-point scale as to how positive or negative a feeling it reflected toward school. The median value of these ratings was taken as the scale value of the statement.

Twenty statements which represented relatively equally spaced intervals along the scale and on which there had been highest agreement among the judges (as measured by the semi-interquartile range) were chosen for the final instrument to be administered to the subjects.

The subjects were asked to indicate whether they agreed or disagreed with each statement. The attitude score for each student, then, was taken as the sum of the scale values of the statements with which the subject indicated agreement.

It was felt that the level of comprehension required for reliable responses was beyond the first-grade level; only subjects from the third and fifth grades were administered this instrument.

The attitude survey had not been administered to students prior to this testing. For this reason, the survey was being validated, and conclusions must be drawn with caution.

CHARACTERISTICS OF THE TEACHING STAFF

It was decided that to assist in the interpretation of achievement and attitude data, certain characteristics of the teaching staff should be observed. It was felt that if major differences existed in such variables as length of teacher experience or amount of professional preparation, these might affect students' achievement and attitudes in ways unrelated to the school's organizational pattern.

The Janesville District personnel records were consulted and data concerning the following characteristics of both experimental and control staffs were obtained: sex, age, amount of professional preparation, and teaching experience. These descriptive data were obtained only for those teachers whose students were tested, and will be reported in succeeding chapters.

CHARACTERISTICS OF THE TEACHING PATTERN

It was also decided to obtain data describing selected characteristics of the teaching pattern in each of the experimental and control schools. Questionnaires were designed and mailed to each unit leader in the experimental schools, and to each control school teacher whose students were tested. The questionnaire was completed and returned to the R & D Center directly.

Information was obtained about each of the following:

1. Estimated amount of time given daily to instruction in reading, other language arts, mathematics, science, and social studies.
2. Estimated amount of time given weekly to planning for instruction in the same five subject areas.
3. Whether planning and instruction in each of these subject areas was done cooperatively or by teachers acting alone.

The Wilson School and Control School A are also involved in a USOE Title III project, and certain data gathered in that project have relevance and will be reported in this study.

During the week of March 18, 1968, the unit leaders and teachers of Wilson School and its control kept detailed logs indicating the ways in which their time was utilized. They were instructed to record daily the approximate number of minutes spent in each of the following: (a) planning for instruction (both alone and with other staff members); (b) preparing for instruction; (c) instruction in 1-to-1, small-group, medium-group and large-group contexts; (d) evaluating instruction (both alone and with other staff members); (e) management functions such as clerical work and noninstructional supervision, and (f) miscellaneous other functions not directly relevant to this report.

Data describing the characteristics of the teaching pattern will be presented in succeeding chapters.

It is realized that many teacher and teaching variables may be operating to affect student achievement and attitudes, and that most of these were uncontrolled in this study. However, it is felt that those group measures which are included may be indicative of major differences between the experimental and control staffs and operations.

III

WILSON ELEMENTARY SCHOOL AND ITS CONTROLS

This chapter will compare the formal organizations, teacher characteristics and some characteristics of the teaching pattern in the Wilson Elementary School and its control schools in Janesville, Wisconsin. Data regarding the achievement and attitudes of children in these schools will then be reported and summarized.

FORMAL ORGANIZATION

Wilson School is organized on the Multi-unit plan. Its students are divided among five units—kindergarten, lower primary, upper primary, lower intermediate, and upper intermediate. Each unit is staffed by a unit leader, 2 to 4 certified teachers, a teacher aide and an instructional secretary. The units meet daily for periods of 30 minutes or more to plan.

The five unit leaders and the principal, acting as an Instructional Improvement Committee, meet twice weekly for periods of an hour or longer to develop total school objectives, achieve coordination among the units, and assess the school program in general.

Two control schools were identified for Wilson School. Control School A provided comparison classes for Grades 1 and 3, while Control School B provided Grade 5 classes. Both control schools used as a comparison for Wilson are organized along the self-contained classroom pattern, with one exception. Control School A utilizes a team teaching approach in science and social studies at the third-grade level.

SELECTED TEACHER CHARACTERISTICS

In May 1968, data were obtained from Janesville school personnel records concerning certain characteristics of the teaching staff at the Wilson School, Control School A, and Control School B. These data include (1) sex and age, (2) level of education, and (3) amount of teaching experience, both total and in the school in which presently employed.

These data are presented in Table 2. It should be noted that the table includes only data which describe the teachers whose students were tested: i.e., all unit leaders and teachers at Wilson except those in the kindergarten unit, the first- and third-grade teachers at Control School A, and the fifth-grade teachers at Control School B.

CHARACTERISTICS OF THE TEACHING PATTERN

Data was obtained, via questionnaires sent and returned during May 1968, concerning these characteristics of the teaching pattern in Wilson School, Control School A, and Control School B:

1. Daily time allotment for instruction in reading, other language arts, mathematics, science and social studies. In the case of Wilson School, these figures were estimated for each unit as a whole by the unit leader. In the two control schools, they were estimated by each teacher whose children had been included in the field-testing.

2. Weekly time spent in planning for instruction in reading, other language arts, mathematics, science and social studies. As in 1 above, these figures were estimated by unit leaders in Wilson and by teachers in the control schools.

3. The dominant mode of instruction—whether by teachers as individuals or in teams—in the same subject fields, according to Wilson unit leaders and control school teachers.

4. The dominant mode of planning—by individuals or in teams—in the same subject fields, according to Wilson unit leaders and control school teachers.

Table 3 presents these data.

In addition to the above data, information obtained from Wilson School and Control School A for purposes of a Title III project is

Table 2. Teacher Characteristics at Wilson and Its Control Schools

	Wilson (N = 17)	Control A (N = 10)	Control B (N = 4)
Sex: Male	3	-	1
Female	14	10	3
Mean Age (in years)	38	37.2	33.5
Education			
Number of Teachers With:			
less than Bachelor's degree	1	1	-
Bachelor's degree	13	9	4
Master's degree	3	-	-
Mean Semester Hours of Undergraduate and Graduate Preparation*	129.5	124.9	131.8
Experience			
Mean years of experience in present school	6.2	4.3	3.8
Median years of experience in present school	2.0	3.5	4.0
Mean years total experience	13.4	11.0	7.6
Median years total experience	5.0	10.0	6.3

*A bachelor's degree is computed at 120 hours, a master's degree at 140 hours.

Table 3. Characteristics of Planning and Instruction at Wilson and Its Control Schools, by Grade Levels

	Wilson	Control A	Control B
Average minutes per day for instruction in:			
Reading			
First-grade level	120	120	
Third-grade level	120	75	
Fifth-grade level	75		68
Other Language Arts			
First-grade level	60	30	
Third-grade level	60	43	
Fifth-grade level	45		62
Mathematics			
First-grade level	40	38	
Third-grade level	30	59	
Fifth-grade level	60		62
Science			
First-grade level	5	19	
Third-grade level	10	27	
Fifth-grade level	25		51
Social Studies			
First-grade level	60	26	
Third-grade level	30	30	
Fifth-grade level	68		60
Average minutes per week in planning for:			
Reading			
First-grade level	450	410	
Third-grade level	350	148	
Fifth-grade level	95		180
Other Language Arts			
First-grade level	60	54	
Third-grade level	200	93	
Fifth-grade level	63		43
Mathematics			
First-grade level	175	50	
Third-grade leve	100	143	
Fifth-grade level	58		60
Science			
First-grade level	30	56	
Third-grade level	80	92	
Fifth-grade level	60		63
Social Studies			
First-grade level	150	72	
Third-grade level	100	92	
Fifth-grade level	70		83

(Continued)

Table 3 (Continued)

	Wilson	Control A	Control B
Mode of instruction in:			
Reading			
First-grade level	Team	Individual	
Third-grade level	Team	Individual	
Fifth-grade level	Team		Individual
Other Language Arts			
First-grade level	Team	Individual	
Third-grade level	Team	Individual	
Fifth-grade level	Team		Individual
Mathematics			
First-grade level	Individual	Individual	
Third-grade level	Individual	Individual	
Fifth-grade level	Individual		Individual
Science			
First-grade level	Individual	Individual	
Third-grade level	Team	Team	
Fifth-grade level	Individual		Individual
Social Studies			
First-grade level	Team	Individual	
Third-grade level	Team	Team	
Fifth-grade level	Team		Individual
Mode of planning for:			
Reading			
First-grade level	Team	Individual	
Third-grade level	Team	Individual	
Fifth-grade level	Team		Individual
Other Language Arts			
First-grade level	Team	Individual	
Third-grade level	Team	Individual	
Fifth-grade level	Team		Individual
Mathematics			
First-grade level	Team	Individual	
Third-grade level	Individual	Individual	
Fifth-grade level	Individual		Individual
Science			
First-grade level	Individual	Individual	
Third-grade level	Team	Team	
Fifth-grade level	Team		Individual
Social Studies			
First-grade level	Team	Individual	
Third-grade level	Team	Team	
Fifth-grade level	Team		Individual

Table 4. Percentages of Instructional Staff Utilized in Various Functions During the Week of March 18, 1968

Function	Wilson School (N = 14)	Control School A (N = 28)
Planning		
Alone	5.2	10.9
With other instructional staff members	6.9	.9
Preparation (assembling materials, etc.)	5.1	8.3
Instruction		
One-to-one	8.9	4.4
Small group (2 to 15)	14.8	12.0
Medium group (16 to 35)	16.2	24.8
Large group (over 35)	2.2	.7
Evaluation		
Alone	4.2	4.2
With other instructional staff members	3.4	.7
Management (clerical tasks, noninstructional supervision)	11.9	18.0
Other	21.2	15.1

reported here, since it sheds further light on the teaching pattern in those schools. During the week of March 18, 1968, the teachers at Control School A and the unit leaders and teachers at Wilson School kept detailed logs recording their utilization of time. Each of these staff members indicated in minutes the amount of time devoted to a variety of activities. Some of the relevant data are summarized in Table 4. It should be noted that these data were recorded anonymously, and that no differentiation by grade levels taught was possible. The figures reported by Control School A represent time utilization by the total staff rather than only by the first and third grade teachers with whom this report is especially concerned.

The preceding data indicate several important organizational and operational differences between Wilson School and its control schools. First, since Wilson School is organized on the Multiunit plan, the practices of cooperative planning and cooperative instruction are much more prevalent there than in the control schools. Cooperative planning and instruction are the mode in reading and other language arts and the social studies in all the Wilson units. In addition, a cooperative approach is used in mathematics by the Lower Primary unit (first grade) and in science by the Upper Primary (third grade) and Lower Intermediate (part of fifth grade) units.

By contrast, the self-contained approach is prevalent at both Control Schools, with the exception that third-grade teachers at Control School A cooperatively plan and instruct in science and in social studies. Control School B uses the self-contained approach in all the basic subject fields.

The prevalence of the cooperative approach and the use of paraprofessional aides at Wilson are further reflected in the data describing the utilization of staff time at Wilson School and at Control School A. Wilson staff used more time planning cooperatively (6.9% to .9%) and less planning alone (5.2% to 10.9%). The presence of aides at Wilson apparently reduced the amount of teacher time utilized in management tasks (11.9% to 18% in Control School A), and in preparing materials for instruction (5.1% to 8.3%). Finally, the Wilson staff more frequently utilized a variety of instructional groupings, spending more time than Control School A staff in one-to-one (8.9% to 4.4%), small-group (14.8% to 12%), and large-group (2.2% to .7%) situations, and less time in more traditional class size groupings of 16 to 35 students (16.2% to 24.8%).

No major differences existed in the sex, age, or educational background of the teachers at Wilson and its control schools. It should be noted, however, that two slight differences in experience favored the control schools. While the mean years of experience of the Wilson staff were greater, both in total experience (13.4 years vs. 11.0 years and 7.6 years) and in experience in the particular school (6.2 years vs. 4.3 years and 3.8 years), more teachers had more of both types of experience in the control schools. This is

indicated by the fact that Control School [illegible] greater *median* of total experience (4.5 years and 4.0 years vs. 2.0 years) and more experience in the particular school (10.0 years and 6.4 years vs. 5.0 years). Apparently, the Wilson staff includes a few teachers of long experience and a large number of relative newcomers.

Finally, it should be noted that the three schools differed markedly in their instructional emphases, as reflected by the amounts of time given to planning and instruction in each of the five basic subject areas. At the first-grade level, the Wilson teachers emphasized the language arts other than reading, mathematics, and social studies more than did first-grade teachers in Control School A, and science less. At third-grade level, reading and the other language arts received considerably more emphasis in Wilson, and science and mathematics received considerably less. Finally, at the fifth-grade level, the Wilson school gave about the same emphasis as Control School B in reading and the other language arts, mathematics, and social studies, and somewhat less emphasis in science.

TEST RESULTS

It is the purpose of this section to exhibit the results of the analyses completed on the data collected at Wilson School and Control School A.

Means and variances were computed for each test at each grade level. Tests of significance of differences between means (Student's t) were completed on pretest data in order to determine the adequacy of the control schools. Whenever possible means are reported in terms of grade equivalents. Means on pretests were used to establish a baseline from which to assess growth during the year. Since tests were administered in October and April all changes (or lack thereof) are based on six months of instruction.

Results are reported in terms of change in mean score, relative difference between experimental and control school changes and significance of differences on pre- and posttest scores.

The results are reported by grade and by subject.

First Grade

Assessment was done at the first-grade level only in mathematics. Results of the pretest administered in October indicated the experimental school to be at the same grade level as the control school. The posttest in April revealed a three month difference in mathematics achievement in favor of the control school. The difference was not statistically significant. These results are summarized in Table 5.

Table 5. Mean Gain on Mathematics Tests of First-Grade Students from Wilson School and Control School A

School	Pretest	Posttest	Gain
Wilson	1.2	1.8	.6
Control A	1.2	2.1	.9

Note.—Scores are grade equivalents.

Although the control school students made higher gains than those from Wilson School, it still may be noted that in spite of the fact that the primary emphasis in Wilson School during this time was on reading and communication skills, these students still gained at the expected rate in math during this six-month period.

Third Grade

Wilson and Control School A were given a pretest (October 1967) and a posttest (April 1968). On both occasions the Doren Diagnostic Reading Test and the Gates-MacGinitie Reading Test were administered. The Gates-MacGinitie Test yields one total test score while the Doren Reading Test consists of nine subtest scores and a total test score.

The pretest showed a significant difference, favoring the control school, on the total test score of the Doren and five subtests of the Doren. Additionally the control school outperformed Wilson on the remaining subtests. The difference on the Gates-MacGinitie was not significant, but was substantial, representing five months in achievement. Significant differences in raw scores for the Doren were on the subtests beginning sounds, speech consonants, ending sounds and plurals, rhyming, and vowels. The means on each pretest are presented in Table 6. It is evident from the data that the two groups were not initially equivalent in reading.

It is not surprising then, that posttest scores were significantly higher for the control school on the total test scores of both

Table 6. Mean Scores on Reading Pretests of Third-Grade Pupils from Wilson School and Control School A

Test	Wilson	Control A
Gates-MacGinitie[a]	3.0	3.5
Doren—Total	82.06*	89.29*
Letter Recognition	8.85	9.06
Beginning Sounds	8.74*	9.49*
Whole Word Recognition	14.43	14.65
Speech Consonants	4.54*	4.88*
Ending Sounds & Plurals	10.34*	12.67*
Blending	7.31	7.90
Rhyming	5.86*	6.81*
Vowels	17.73*	19.24*
Homonyms	4.22	4.58

[a]Score given in grade equivalents.
*Difference significant at .05 level.

Table 7. Mean Scores on Reading Posttests of Third-Grade Pupils from Wilson School and Control School A

Test	Wilson	Control A
Gates-MacGinitie[a]	3.6*	4.3*
Doren	89.64*	96.50*

[a]Given in grade equivalents.
*Difference significant at .05 level.

Table 8. Mean Gains on Reading of Third-Grade Pupils from Wilson School and Control School A

Test	Wilson	Control A
Gates-MacGinitie[a]	0.6	0.8
Doren—Total	7.58	7.21
Letter Recognition	0.39	0.18
Beginning Sounds	0.59	0.35
Whole Word Recognition	0.22	0.22
Speech Consonants	0.29	0.09
Ending Sounds & Plurals	2.05	0.98
Blending	1.33	1.98
Rhyming	0.87	1.31
Vowels	1.58	2.47
Homonyms	0.29	0.27

[a]Score given in grade equivalents.

the Gates-MacGinitie and the Doren. Wilson School gained six months in reading, while the mean control gain was eight months on the Gates-MacGinitie.

Table 7 presents total posttest scores for both schools.

Finally we may compare the gains made in the two schools between the two administrations of the tests. These are presented in Table 8.

It is evident that Wilson School made gains equivalent to those in the control school on the Doren Diagnostic Test. Furthermore, the six-month gain during a six-month period on the Gates-MacGinitie, while not matching that of the control school, represents satisfactory performance for pupils below national norms.

In mathematics the pretests and posttest administered at the third-year level were item sampled batteries consisting of questions from the SRA Achievement Series, Stanford Achievement Tests, and the Iowa Tests of Basic Skills. There were five subtests in the evaluation series.

The control school was statistically superior to Wilson on three of the subtests in the pretest. These subtests were: Stanford computation, SRA concepts, and Iowa problem solving. Furthermore, the control school also had a higher mean, though not significantly higher, on the remaining subtest. The pretest means are presented in Table 9. Again it is evident that Wilson's control was not equivalent with respect to entering performance in the area of mathematics.

Table 9. Mean Pretest Scores in Mathematics for Grade Three, Wilson School and Control School A

Test	Wilson	Control A
Stanford Computation[a]	2.1*	2.6*
SRA Concepts	4.14*	5.47*
SRA Problem Solving: Analysis	1.10	1.12
Iowa Concepts*	1.9	2.1
Iowa Problem Solving*	2.7*	3.0*

[a]Score given in grade equivalents.
*Difference significant at .05 level.

When the gains made on the Stanford and Iowa tests are inspected, it is evident that both groups made at least six-months progress in the six-month interval between tests. Grade equivalents for the SRA tests are not available. Outstanding growth was made on the Arithmetic Concepts subtest of the ITBS by both groups. Posttest grade equivalents and the gain scores for each school are reported in Table 10.

From this table, it is evident that while the control school's posttest means exceeded those of Wilson, there is every reason to be satisfied with Wilson pupils' growth. Below grade level on all three tests in the fall, Wilson's mean for the spring tests was at grade level on two of the three tests. Computation is a weakness at both schools, particularly at Wilson.

It should also be noted, however, that third-grade mathematics received considerably less emphasis at Wilson than at the control school. As indicated in Table 3, the control school devoted 143 minutes per week to planning mathematics instruction and 59 minutes per day to actual instruction in mathematics, compared to 100 minutes per week in planning and 30 minutes per day instruction at Wilson.

Furthermore, on the SRA tests, for which raw scores only are available, there was no significant difference between the experimental and control school at the end of the year. This fact compares favorably with the initial superiority of the control school on the SRA Concepts subtest. Posttest means and gains are presented in Table 10.

The posttest battery included an attitude survey which was administered to Wilson and Control School A. It was hoped that this would aid in understanding academic variations. The maximum score on the survey was 121 where a difference in school means reflects a difference in positive attitude toward school and teachers. The survey mean for Wilson was 80 and the mean for Control School A was 80. Therefore, this survey did not detect any attitudinal variations between Wilson and its control.

Fifth Grade

An item-sampled battery consisting of five reading subtests from the Iowa Test of Basic Skills was administered to Wilson and Control School B for both the pre- and post-experimental measure. The results of both test administrations are presented in Table 11. In four of the five pretests the control pupils performed somewhat better than Wilson students. This was true again in the spring.

Iowa vocabulary showed no significant difference between Wilson and its control for either the fall or spring testing. During the interval between test administration the two schools measured equal gains in terms of grade equivalent scoring. The Iowa comprehension pretest showed a significant difference between Wilson and its control with superior achievement in the control school. The posttest indicated that the difference between schools after the instructional period (six months) was not significant.

The schools were initially equivalent on the Iowa map reading pretest. The posttest showed a significant difference favoring the control school. Table 11 shows that Wilson did not gain (grade equivalent) during the instructional period while the control school advanced. In contrast, the control school was stationary in performance on the subtest entitled Reading Graphs and Tables, while Wilson pupils gained an average of five months.

Iowa indexes, sources, and alphabetizing were combined to form a group called "Use of Reference Sources." The schools were statistically equivalent in both the fall and spring. Both made substantial gains in terms of grade equivalents.

Differences in fifth-grade reading achievement probably cannot be explained by differences in the amounts of time given reading by the two schools. However, it is worth noting that while reading instruction time was about the same (75 minutes per day in Wilson and 68 minutes per day in Control School B), the control school reported almost twice as much time per week devoted to planning instruction in reading (180 minutes vs. 95 minutes in Wilson).

Item sampling was again used for testing the mathematics achievement of Wilson and its control. Both fall and spring batteries contained subtests drawn from the SRA Achievement Series and Iowa Tests of Basic Skills.

Both schools scored consistently below grade level in the fall, as is evident in Table 12. The control school scored significantly higher on the pretest SRA concepts. Wilson was statistically superior on the subtest Iowa problem solving. For the remaining subtests no significant difference between the schools was observed.

Gains on the tests were highly variable, ranging from .3 to 1.2 years on different subtests for Wilson School. As in third grade, the greatest growth was in the area of arith-

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metic concepts and the least in arithmetic computation. In fact, the control school overcame its initial disadvantage in computation and its pupils performed significantly better than Wilson pupils on the computation posttest.

The measures of scientific achievement for Grade 5 were the Stanford Achievement Test and the Sequential Tests of Educational Progress. The results of the tests are inconsistent, probably reflecting the differing content of the tests. Whereas both group means were well below grade level on the Stanford science subtest, both fall and spring, percentiles attained by both schools on the STEP were above average, indicating perhaps a difference in either the content or norming samples for the two tests.

Table 10. Mean Posttest Grade Equivalents and Gain Scores in Mathematics for Grade 3, Wilson School and Control School A

Test	Wilson		Control A	
	Posttest	Gain	Posttest	Gain
Stanford Computation[a]	2.7*	.6	3.6*	1.0
SRA Concepts	7.02	2.88	7.61	2.14
SRA Problem Solving: Analysis	1.58	.48	1.76	.64
Iowa Concepts[a]	3.8	1.9	4.2*	2.1
Iowa Problem Solving[a]	3.8*	1.1	4.1*	1.1

[a]Score given in grade equivalents.
*Difference significant at .05 level.

Table 11. Pre- and Posttest Grade Equivalents on Reading Test Grade 5, Wilson and Control School B

Test	Wilson			Control B		
	Fall	Spring	Gain	Fall	Spring	Gain
Iowa Vocabulary	5.1	5.6	.5	5.3	5.8	.5
Iowa Comprehension	5.0*	5.1	.1	5.2*	5.4	.2
Iowa Map Reading	5.3	5.3*	.0	5.1	5.9*	.8
Iowa Graphs & Tables	5.3	5.8	.5	5.6	5.6	.0
Iowa Reference Sources	4.9	5.8	.9	5.2	6.0	.8

*Significantly different at .05 level.

Table 12. Pre- and Posttest Grade Equivalents on Mathematics Tests Grade 5, Wilson and Control School B

Test	Wilson			Control B		
	Fall	Spring	Gain	Fall	Spring	Gain
SRA Reasoning	4.3	4.8	.5	4.3	4.3	.0
SRA Concepts	4.5*	5.7	1.2	5.1*	5.9	.8
SRA Computation	4.9	5.2*	.3	4.7	5.9*	1.2
Iowa Concepts	4.6	5.2	.6	4.7	5.3	.6
Iowa Problem Solving	4.3*	4.9	.6	3.9*	5.3	1.4

*Significantly different at .05 level.

Table 13. Mean Pre- and Posttest Standings in Science Grade 5, Wilson and Control School B

Test	Wilson		Control	
	Fall	Spring	Fall	Spring
Stanford Achievement	3.8	4.2	4.7	4.7
STEP	71%	71%	75%	79%

From Table 13 it is evident that Wilson's mean performance was consistently below that of Control School B. This was true for both tests and both testing occasions. It may also be noted that while Wilson and its control gave about the same amount of planning time to science (60 and 63 minutes weekly, respectively), the control allotted about twice as much daily instruction time to science (51 minutes vs. 25). (See Table 3.) However, neither gains nor changes in standing for either school are substantial enough to warrant further comment.

Fifth graders, as well as third graders, responded to an attitude survey in the spring. The mean score for Wilson was 81 and the mean score for its control was 74. This difference was statistically significant. Since this survey was not given in the fall, it is not known whether this variation is a reflection of students' reaction to the methods of unit teaching used by Wilson during the school year. At best, it can be stated that at the end of the school year the students at Wilson had a more positive attitude toward school and teachers than did the students in the control school.

In summary, we may note that Wilson pupils, although initially performing below grade level in some grades and some subjects, generally made at least the expected growth during the six-month interval between tests. At the first-grade level, where only mathematics achievement was measured, the control school outperformed Wilson, but Wilson's growth was as great as expected. Pretest scores in both reading and mathematics at the third-grade level indicated that Wilson and its control were not initially comparable. Even so, Wilson's gains in reading on the whole matched those of the control. Mathematics growth on the three tests where grade equivalents were available showed an average increment across both tests and pupils of 1.2 years for Wilson pupils. These gains compared favorably with those of the control school despite the latter's devoting twice as much time both to the mathematics instruction and its planning. At the fifth-grade level, again, Wilson and its control were not well matched with respect to reading. Neither school made outstanding gains in this area. In the mathematics area, Wilson's average gains were better than 6 months across all tests for which grade equivalents were available. Generally, both third and fifth grades showed higher achievement in arithmetic concepts than in computation.

Results of the attitude survey indicate that there was no difference between Wilson and its control at the third-grade level whereas there was a difference in favor of the Multiunit School at the fifth-grade level.

IV

THE ADAMS SCHOOL I AND R UNIT AND ITS CONTROL

Data concerning the formal organization, teacher characteristics and some characteristics of the teaching pattern in the Adams School I and R Unit and in four fifth-grade classrooms at Control School C are reported below.

FORMAL ORGANIZATION

The fifth and sixth grade at Adams School are organized into a single I and R Unit staffed by a unit leader, five teachers and two teacher interns. The unit meets regularly during the week to plan and coordinate its work with the other self-contained classes in Adams School through the principal.

Although there is a formal teaching team at the second-grade level and some informal cooperative teaching at the sixth-grade level at Control School C, the fifth grade with which this report is concerned is organized in two self-contained classrooms.

SELECTED TEACHER CHARACTERISTICS

Data obtained from school personnel records in May 1968 describe the sex, age, level of education and amount of teaching experience of the unit leader and teachers at Adams School and the fifth-grade teachers at Control School C.

These data are presented in Table 14.

Table 14. Teacher Characteristics in Adams School I and R Unit and Its Control

	Adams I and R Unit (N = 6)	Control (N = 2)
Sex: Male	3	1
Female	3	1
Mean age (in years)	34.3	46
Education:		
Number of Teachers With:		
less than Bachelor's degree	--	--
Bachelor's degree	4	2
Master's degree	2	--
Mean Semester Hours of Undergraduate and Graduate Preparation*	143.7	141.0
Experience:		
Mean years of experience in present school	5.6	22.5
Median years of experience in present school	6.0	22.5
Mean years total experience	8.8	23.5
Median years total experience	8.5	23.5

*A Bachelor's degree is computed at 120 hours, a Master's degree at 140 hours.

CHARACTERISTICS OF THE TEACHING PATTERN

Data was obtained, via questionnaire sent and returned during May 1968, concerning some characteristics of the teaching pattern in the I and R Unit at Adams School and the fifth grades at Control School C. In each case the data was reported by the Adams unit leader for the entire unit, and by each of the four Control School C fifth-grade teachers. The characteristics measured were:

1. Daily time allotment for instruction in reading, other language arts, mathematics, science and social studies.
2. Weekly time spent in planning for instruction in the same subject fields.
3. Dominant mode of instruction—team or individual—in the same subject fields.
4. Dominant mode of planning—team or individual—in the same subject fields.

Table 15 presents these data.

Data in Tables 14 and 15 indicate that except for the mode of instruction in science and social studies (team at Adams and individual at its control), the characteristics of the teaching staff and teaching pattern were similar. The staffs were alike in amount of education and in ratio of male to female, but the control school staff is considerably older and more experienced, both in their school and in total years of teaching.

Adams and its control exhibited different instructional emphases. Adams emphasized science more: 55 minutes per week planning vs. 25 in the control, and 35 minutes daily instruction vs. 18 minutes in the control. The control school emphasized mathematics more than the Adams Unit, using more planning time (150 minutes per week vs. 70 in Adams) and about the same amount of instructional time (45 vs. 55 minutes per day). The control school also emphasized reading more, allotting 90 minutes for planning (vs. 70 minutes in the Adams unit), and the same amount of daily instruction in reading (60 minutes in each). Finally, Adams gave slightly more planning emphases to language arts (50 minutes per week vs. 25), although the daily instructional allotment was the same in both schools (30 minutes). Table 15 presents these data.

TEST RESULTS

This section includes the results of the analyses of the data collected from fifth-grade pupils at Adams and Control School C. The subjects tested were reading, mathematics, and science. The testing battery also included an attitude survey.

The data were analyzed using means and variances of scores on each subject. Each subject was tested first in the fall, October (pretest), and again in the spring, April (posttest), with a six-month interval between tests. The pretest served as a baseline for measuring pupil academic growth and as a comparison of schools to test the adequacy of the control. Significant (.05) differences between the schools were calculated using Student's t. Results include change in mean scores, relative differences between experimental and control schools, and significance of differences on pre- and posttest scores.

Mean grade equivalents of fifth graders at Adams and its control on the reading subtests are presented in Table 16. Adams and its control were initially equivalent on the subtests Iowa vocabulary and Iowa graphs. Adams pupils, on the average, performed significantly better on the map reading and reference sources pretests, however.

Outstanding gr[illegible]h was achieved by both groups in vocabulary. Adams gains, in terms of grade equivalent, was 2.1 years; the control school's mean gain 2.0 years.

The control school showed greater gains in the two tests in which its performance was initially lower than Adams. There was no significant difference between the reading performance of the two schools on any of the tests given in the spring. Typical performance for pupils in either group was above grade level on any subtest. Considering the initial scores in vocabulary, which were well below grade level, the improvement during the year of both groups was satisfactory.

As noted above, Adams did not place emphasis on its reading instruction, whereas the control school reported that it did. The control school allowed more minutes per week for planning daily reading instruction.

An item sampling battery consisting of mathematics subtests drawn from standardized tests was administered to pupils at Adams and its control school. The standardized tests used were: SRA Achievement Series, Iowa Tests of Basic Skills, and Stanford Achievement Test—the last being administered in the spring only.

Results on the mathematics subtests showed that Adams was statistically superior to its control school on the subtest SRA concepts, while the control school performed significantly better on the subtest SRA

computation. Differences between schools on the remaining subtests were not significant.

Posttest evaluations showed Adams again scoring significantly higher on the subtest SRA concepts, the pupils having made an average gain of seven months in a six-month interval. Also, Adams was statistically superior on the subtest SRA computation.

Table 15. Characteristics of Planning and Instruction in the Adams School I and R Unit and Control School C

	Adams I and R Unit	Control C
Average minutes per day for instruction in:		
Reading	60	60
Other Language Arts	30	30
Mathematics	55	45
Science	35	18
Social Studies	100	105
Average minutes per week in planning for:		
Reading	70	90
Other Language Arts	50	25
Mathematics	70	150
Science	55	25
Social Studies	90	90
Mode of instruction in:		
Reading	Individual	Individual
Other Language Arts	Individual	Individual
Mathematics	Individual	Individual
Science	Team	Individual
Social Studies	Team	Individual
Mode of planning for:		
Reading	Individual	Individual
Other Language Arts	Individual	Individual
Mathematics	Individual	Individual
Science	Team	Individual
Social Studies	Team	Individual

Table 16. Mean Grade Equivalents on Reading Subtests of Adams Fifth Grade and Control School C

	Adams			Control C		
	Fall	Spring	Gain	Fall	Spring	Gain
Iowa Vocabulary	4.0	6.1	2.1	4.0	6.0	2.0
Iowa Map Reading	5.9*	5.9	.0	5.3*	6.1	.8
Iowa Graphs	5.8	6.3	.5	5.8	6.1	.3
Iowa Use of References	5.9*	6.4	.5	5.2*	6.3	1.1

*Difference significant at .05 level.

Figure 2 illustrates the dramatic gains made by Adams pupils on this particular test. While the remaining subtests did not reveal significant differences between the schools, it should be noted from Table 17 that on all tests Adams was equal or superior to the control school by the end of the year. Furthermore, in every instance Adams gains were greater than expected during a six-month interval between tests. Initially working at grade level in only one of the mathematical abilities tested. Adams pupils performed at or above grade level on all subtests except one in the spring. Both schools handled mathematics instruction on an individual classroom basis. While Adams reports devoting ten more minutes per day to mathematics instruction, the control school teachers spent twice as much time planning the instructional program in this area.

Pre- and posttest item-sampled batteries in science consisting of the Stanford Achievement and the Sequential Tests of Educational Progress (STEP) were administered to Adams and its control school. The results are reported in Table 18. A significant difference between schools on the Stanford subtest favored Adams on both testing occasions. During this experimental period the mean grade score for Adams subjects increased by four months while that for the control school increased only one month. Differences between the two schools on the STEP test were not significant on pre- or posttests.

The science teaching method emphasized by Adams used both cooperative teaching and cooperative planning. In spite of this and the fact that science was emphasized at Adams, even the experimental subjects failed to achieve the expected six-months gain during this period. However, their gains relative to the controls are noteworthy on both tests.

The mean scores on the attitude survey for Adams school and the control differed by only one point. The mean score for Adams

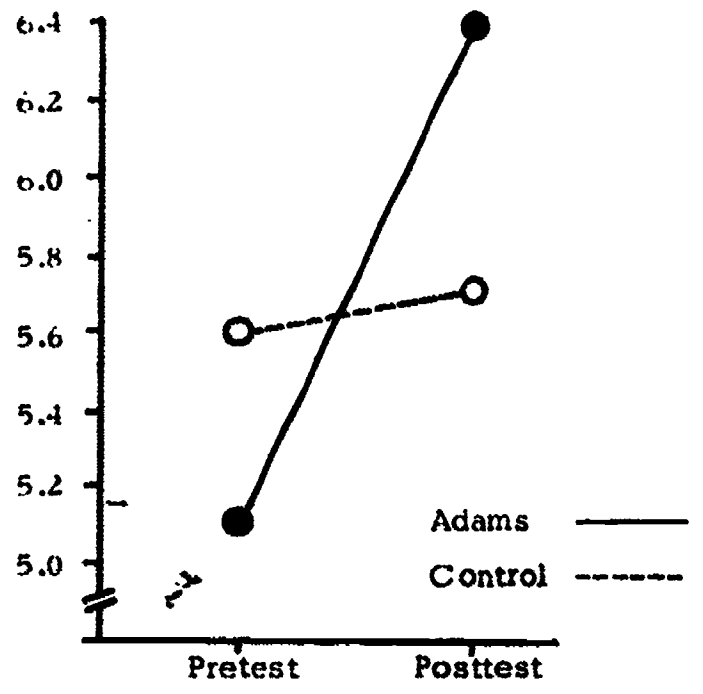

Figure 2. Change on the SRA computation subtest at Adams and its control school.

was 76 while that for its control was 77. This difference was not statistically significant.

In summary, it is evident that the performance and growth of Adams pupils was satisfactory in general and outstanding in selected areas. Performance was above grade level in reading at both schools by the end of the year, and outstanding growth was made in vocabulary. Adams averaged 1.1 years growth on the four mathematics subtests for which both fall and spring scores were available. Initially comparable to the control school overall in this area, Adams performance was consistently superior by the end of the year. The growth of the I and R Unit students in science was also somewhat better than that of the control students.

Table 17. Mean Grade Equivalents on Mathematics Tests of Adams Fifth Grade and Control School C

Tests	Adams			Control C		
	Fall	Spring	Gain	Fall	Spring	Gain
SRA Concepts	5.6*	6.3*	.7	5.1*	5.6*	.5
SRA Computation	5.1*	6.4*	1.3	5.6*	5.7*	.1
Iowa Concepts	4.6	5.9	1.3	4.4	5.6	1.2
Iowa Problem Solving	4.6	5.8	1.2	4.6	5.8	1.2

*$p < .05$

Table 18. Science Test Scores for Adams Fifth Grade and Its Control

Tests	Adams		Control	
	Fall	Spring	Fall	Spring
Stanford Achievement[a]	5.0*	5.4*	4.5*	4.6*
STEP	75%	79%	75%	75%

[a]Grade equivalent scores.
*Differences significant at .05 level on both fall and spring tests.

V

SUMMARY AND CONCLUSIONS

The study reported here was an attempt to answer the question, Do the attitudes and achievement of students in a Multiunit school and in an Instruction and Research Unit in Janesville, Wisconsin, differ significantly from the attitudes and achievement of students in three traditionally organized schools in the same city?

Achievement was measured by use of both complete and item-sampled batteries of standardized achievement tests. These tests were administered in experimental and control schools in October 1967 and in April 1968.

Attitudes were measured, in April 1968 only, by means of an attitude survey especially constructed for the purpose.

In addition to achievement and attitude measures, certain other data descriptive of each school's teaching staff and teaching pattern were obtained, and used to assist in the interpretation of achievement data.

Review of the data reported in the preceding sections of this report yields several findings and permits some tentative conclusions.

FINDINGS

1. Although care was initially exercised in the selection of control schools, the pretest data indicated that, in terms of students' achievement, both Wilson School and the Adams School I and R Unit were poorly matched with their controls.

In October 1967, 29 test and subtest scores were obtained on first, third, and fifth graders at Wilson and at its control schools. Differences between Wilson and its controls on the October pretests were tested for significance at the .05 level. Twelve of the 29 scores were found to be significantly different; 11 of the 12 significant differences favored the control school.

The situation was reversed in the case of the Adams School I and R Unit. Fifth graders at Adams and its control were compared on ten test and subtest scores as of October 1967. Significant differences (.05) were found on five of these scores, and four of the five significant differences favored the Adams students.

As is often the case in such research, therefore, the experimental and control students were not initially comparable, and conclusions concerning their achievement growth must be drawn with caution.

2. No systematic differences in students' achievement growth were found to exist between the Multiunit School and I and R Units, and their control schools. Although differences did appear in specific subject matters at specific grade levels, the total pattern of achievement growth did not differ substantially.

Several modes of comparison lend support to this finding. First, experimental and control schools can be compared in terms of their relative equivalence in achievement on the pretests and on the posttests. As noted above, on 29 achievement pretest scores, Wilson was significantly inferior to its control schools on 11 and significantly superior on 1. On 20 posttest scores,[2] the control schools were significantly superior on 7, and there were no significant differences on the remaining 13. These data indicate that the relative position of Wilson and its controls had not shifted substantially.

The Adams School I and R Unit was significantly superior to its control on 4 of 10 pretest scores and significantly inferior on one. On 11 posttest scores,[3] Adams students were

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[2]The difference is due to the fact that third-grade Doren Diagnostic Reading Test subscores were not tested for significance or difference.

[3]The Stanford Achievement Test, Intermediate II, Form W, computation section, was administered as a posttest only.

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[illegible] significantly superior on 5 scores and control school students on four.

A second means of analysis is to compare group gains from pre- to posttest between experimental and control students.[4] Group gains on 29 tests were measured for both Wilson and its control schools, in raw scores and grade equivalents. On 15 of the tests, the control school showed greater group gains. On 12 tests Wilson students obtained greater group gains, and on the remaining 4 tests group gain scores were identical.

The situation differed somewhat with the Adams I and R Unit and its control. A comparison of group gain scores indicated that Adams students gained more on seven of the ten tests, the control students gained more on two, and the gains were identical on one. This evidence, however, is offset by the other comparisons made previously and that which follows.

A third means of comparison is to assess group progress of both experimental and control students against the national norms of the achievement tests used. Sixteen of the 29 tests administered at Wilson and its controls yield grade equivalence scores. On 9 of these tests, Wilson students made at least the six-months expected gains or more,[5] while on 7 they made less than six-months gain. Control school students gained six months or more on 11 tests, and less than six months on 5.

Adams I and R Unit students and students in its control school each gained, as groups, six months or more on five of nine tests, and less than six months on the remaining four tests.

In short, several methods of comparison lend substantial support to the finding that there were no systematic differences in achievement growth between the Multiunit and I and R Unit students and the students in the control schools.

3. There is insufficient evidence to conclude either that there were or were not significant differences in experimental and control students' attitudes towards school.

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[4]Differences in these gain scores cannot be assessed for statistical significance because of the nature of the item-sampling approach used in this study. However, a broad comparison such as the one described can be used with caution and as minor evidence for the finding.

[5]The tests were administered in October 1967 and April 1968, an interval of six months.

The instrument used to measure attitudes was developed for this study, and has not been validated. It was used only in April 1968 and no evidence exists of initial attitudinal equivalence between control and experimental students. Of three comparisons, between third and fifth graders in Wilson and its controls and between fifth graders in Adams and its control, only one showed a significant difference: Wilson fifth graders had more positive attitudes than did fifth graders at Control School B.

CONCLUSIONS

The foregoing analyses suggest two major conclusions.

First, the achievement of students does not seem to be affected adversely during the transition from traditional, self-contained school organization to the Multiunit plan. Although Wilson School began that transition in the fall of 1967, Wilson students apparently did not lose ground in achievement during 1967–68 in comparison to control school students. Furthermore, although the Adams School I and R Unit has been in operation longer, its students also did not suffer in terms of achievement during 1967–68.

Second, further longitudinal data concerning the achievement growth of Multiunit and I and R Unit students in comparison to control school students is warranted and essential. In the Introduction to this report, we suggested that significant achievement gains by Multiunit students are likely to come, if at all, after the first and perhaps the second year of Multiunit operation, at a time when operational proficiency has been reached. To test that hypothesis further research is needed.

Such research is underway. During 1968–69, the Wisconsin R & D Center will obtain data in an attempt to answer these questions:

1. Do pupils in the Multiunit School have the same entering performance as did those in the same school who were at the same grade level during 1968–69?
2. Do pupils in the Multiunit School have the same terminal performance as did those in the same school who were at the same grade level during 1968–69?
3. Do pupils in the Multiunit School show the same growth over a two-year period as pupils in the control school?

Final conclusions concerning the effects of Multiunit and I and R Unit operations on student achievement must await further evidence of the kind which will be sought during 1968–69.